The application of laterally positioned flap for root coverage in childhood

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**ABSTRACT**

**Background** Gingival recessions can occur in childhood/adolescence and early detection and close monitoring may prevent progression. Assessment for surgical correction should be delayed until completion of permanent teeth eruption, except for cases where the gingival recessions are associated with progressive increase, high frenum attachment or future orthodontic movement in buccal direction. **Case report** Two children were treated where gingival recessions were therapeutically managed with laterally positioned flap. The technique is indicated in cases where there is no proximal periodontal support loss and there is a thick and wide zone of proximal keratinised tissues. **Follow-up** The final assessment of the treatment outcome was performed at 8 months postoperatively. The root surface was completely covered by a 5 mm wide zone of keratinised tissues and there was complete colour, volume and texture matching between the tissues covering the root and the surrounding tissue. **Conclusion** The use of only one surgical site reduces the time required for the performance of the technique and the intra-operative and postoperative patient discomfort, which are important when attempting root coverage in children and adolescents.

**KEYWORDS**: Gingival recession, Mucogingival defects, Childhood, Root coverage, Laterally positioned flap.

**Introduction**

Gingival recession is defined as the location of the gingival marginal tissues apically to the cemento-enamel junction, followed by partial or complete loss of the keratinised tissues. Loss of these tissues leads to exposure of the alveolar mucosa to every day mechanical trauma and to possible inflammation. The alveolar mucosa is a non-keratinised, highly elastic tissue prone to inflammatory breakdown.

Gingival recession beyond the mucogingival line causes mucogingival defects, which affect morphology, position and/or amount of gingiva surrounding the teeth.

Gingival recession can occur in children and adolescents [O’Leary, 1967] and a prevalence of 12 to 19% has been reported [Maynard and Ochsenbein, 1975]. Gliksberg et al. [1989] randomly examined 1,302 teeth and reported that only 1% of them showed complete absence of attached gingival tissue. The aetiology may be due to tooth eruption patterns, narrow bucco-lingual width of the periodontal tissues (bone and gingiva), chronic trauma (i.e. traumatic toothbrushing), oral habits (i.e. nail picking), high frenum attachment, inflammation of the periodontal tissues, malocclusion and careless orthodontic movement in buccal direction and mucogingival defects [Maynard and Wilson, 1980].

Early detection of mucogingival recession and of initial treatment may prevent their progression and facilitate therapeutic management. The morphology of the periodontal tissues of the developing dentition should be taken into consideration when examining young individuals for possible presence of mucogingival defects. In general, the width of attached gingiva is greater in the permanent than in the primary dentition [Rose and App, 1973]. In the mixed dentition, the width of attached gingiva becomes reduced, which could be attributed to the deeper gingival crevices of the permanent teeth compared with the primary teeth [Srivastava et al., 1990; Peretz et al., 1996]. Tenenbaum and Tenenbaum [1986] showed that the width of the attached gingival zone continues to increase with age in both primary and permanent dentitions and the width of the attached gingiva might continue to increase during the third decade of the life [Ainamo et al., 1981].

Initial mucogingival defects may be eliminated or even reduced spontaneously during normal growth and development in plaque free dentitions [Persson and

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Lennartsson, 1986; Andlin-Sobocki et al., 1991]. Therefore, the final assessment for surgical correction of the mucogingival defects should be delayed, where possible, until the child’s growth has been completed [Andlin-Sobocki et al., 1993; Andlin-Sobocki and Bodin, 1993]. Until the completion of the growth, close monitoring of any mucogingival defects is imperative for prevention of defect progression, but defects of increasing severity are indications for treatment even if eruption of the permanent teeth has not been completed. Gingival recession associated with progressive increase, high fraenum attachment or located in sites where orthodontic tooth movement in buccal direction will be performed, require immediate therapeutic management [Wennström 1996; Camargo et al., 2001].

Laterally positioned flap or lateral pedicle flap. The surgical technique of laterally positioned flap was first introduced by Grupe and Warren [1956], under the term sliding flap. They applied this technique for root coverage and attached gingival zone increase in isolated gingival recession defects located on the buccal surfaces of the mandibular anterior teeth. As described initially, the technique consisted of preparation of a trapezoid flap of full thickness from the gingival margin to the mucogingival line and of partial thickness from the mucogingival line and further apically. The flap was rotated, laterally positioned and sutured on top of the denuded root. The technique was then subjected to various modifications by a number of clinicians, more recently by Goldman et al. [1982].

Grupe [1966] suggested the application of a submarginal incision at the donor site and maintenance of a narrow zone around the gingival margin of the proximal tooth to prevent potential gingival recession. In 1964, Staffileno suggested the use of partial thickness flap for prevention of potential gingival recession at the donor site. Robinson and Corn [1964] used the proximal edentulous area as donor site for the laterally positioned flap creation, which facilitates tissue handling due to the increased thickness of the tissues. Later, Goldman et al., [1982] described the combination of partial and full thickness flap, where the trapezoid flap is of full thickness towards the denuded root and of partial thickness towards the donor site.

Today, the laterally positioned flap is indicated for root coverage and creation or increase of the zone of attached gingiva in localised sites (1 or 2 teeth), with intact periodontal support in the proximal surfaces. At least one proximal area next to the defect should have keratinised tissues of adequate thickness and width [Waal et al., 1988]. The extensive loss of periodontal tissues at proximal sites of the tooth with the defect, the absence of thick and wide keratinised tissues in the proximal sites, the prominent root convexity and the deep and extensive root abrasion or root caries are the main contraindications for the application of the technique.

The laterally positioned flap offers the advantages of only one surgical site, as the donor site is next to the recipient one, of adequate vascularity of the pedicle flap and of the high treatment effectiveness. However, the technique has some limitations, such as it entails the risk for gingival recession at the donor site, the zone of keratinised tissue can not predictably be increased in width and only a limited number of teeth can be managed each time with the technique.

Case reports

Case 1

A 12-year old girl was referred to a private periodontal practice, by an orthodontist as her parents reported that her gumline in the lower anterior area was progressively receding during the previous year. Her medical history was not contributory and she was not taking any medication. A clinical examination revealed generalized gingivitis and crowding of the mandibular anterior teeth. The mandibular right central incisor (tooth 41) presented a 5 mm deep and 3 mm wide gingival recession with mucogingival problems of the buccal surface (Fig. 1a). There was only a minimal zone of keratinised tissues, of 1 mm width, on the buccal aspect of tooth 41. The gingival recession was of moderate depth and width; it was classified as Class I according to Miller’s classification [1985]. After completion of the evaluation the girl and her parents were informed of the periodontal problems present. She was given oral hygiene instruction in daily meticulous dental plaque removal by using a soft toothbrush and dental floss.

Treatment. Periodontal treatment initially consisted of removal of all plaque, et cetera and reevaluation of the periodontal tissues was performed at 2 and 4 weeks post-debridement. The inflammation of the periodontal tissues was reduced at 4 weeks, as assessed by the reduction in bleeding on probing. The mandibular anterior sextant had residual inflammation of the periodontal tissues, partly attributed to the crowding of the teeth, and buccal gingival margin of 41 was stabilized at its initial level.

Consideration was given to therapeutic intervention after initial treatment for the purpose of root coverage and keratinised tissues creation or long-term
monitoring until completion of eruption of all the permanent teeth and then to decide to treat it or not. An orthodontic consultation revealed that the child would be subjected to later orthodontic treatment and that the mandibular anterior teeth would have to be moved in a labial direction to achieve a better alignment in the dental arch. Based on the parents’ report on progressive increase of the gingival recession, the buccal position of 41 and the need for orthodontic intervention an active management of the gingival recession was chosen. The criteria for selecting a surgical approach included the extent of the gingival recession, the absence of proximal periodontal support loss and the abundance of proximal keratinised tissue.

The young age of the patient influenced the initial decision to prefer the laterally positioned flap over the other surgical techniques, as there would be no need for a second (donor) surgical site. Therefore the laterally positioned flap was selected for root coverage in the present case.

Meticulous scaling and root planning of the exposed surface was performed prior to the surgical procedure to remove all plaque and calculus and to reduce the root convexity. A V-shaped incision was performed around the defect margins, 1 mm apically to the gingival margin, to remove a thin layer of epithelium.

This incision was beveled on the opposite side from the donor area in order to permit overlap and increased vascularity for the donor tissue in this area. The thin band of epithelium between the gingival margin of tooth 41 and the V-shaped incision was completely excised. Next, a single vertical releasing incision was made to prepare a trapezoid partial thickness flap at the distal proximal site, including the proximal interdental papilla and extending to the midbuccal surface of 43 (Fig. 1b). The mesio-distal width of the flap was 1.5 times wider than that of the recipient site to overcome wound contraction. The vertical incision extended 3 mm apically to the mucogingival line to laterally displace the flap, without any tension which might cause flap necrosis. The coronal border of the trapezoid flap was defined by a submarginal incision. This incision was made at a distance of 1 to 2 mm apically to the gingival margin to prevent gingival recession at the donor site.

After elevation of the trapezoid flap it was rotated and mesially displaced on top of the denuded root to completely cover it. The coronal margin of the flap was placed at the level of the cemento-enamel junction of the recipient tooth. The flap was sutured with resorbable 4/0 sutures by using simple interrupted suturing technique. The flap was then pressed against...
the root surface for 3 to 5 minutes [Bouchand et al., 2001] to reduce the width of the blood clot between the internal surface of the flap and the root surface. Close adaptation of the flap to the root surface and stabilisation of the flap was achieved (Fig. 1c), which is imperative for a successful treatment outcome [Wikesjo et al., 1992].

**Follow-up.** Thorough postoperative instructions were given to the patient to prevent flap displacement and wound disruption and avoidance of mechanical removal of dental plaque by toothbrushing or chewing for 3 weeks [Bouchand et al., 2001]. Brushing with a soft toothbrushing was recommended. Rinsing with 0.12% chlorexidine solution twice daily, for the first 2 weeks postoperatively, chemically controlled plaque followed by chlorexidine gel, twice daily, for another 2 weeks. The patient was examined 10 days post-operatively, by which time most of the sutures had resorbed or exfoliated. Healing was uneventful and the patient was monitored weekly for one month and every 3 weeks for the following two months. After 3 weeks postoperatively the root was almost completely covered, except for the most coronal 0.5 mm, by a thick zone of keratinised tissue (Fig. 1d) and the treatment outcome was considered to be successful.

**Case 2**

A specialist paediatric dentist referred an 11-year-old boy for a deep gingival recession on the buccal surface of the mandibular right central incisor (41) to a private periodontal practice. The gingival recession was Miller Class I with 7 mm depth and 3 mm width. All keratinised tissues were lost except for 1.5 mm (Fig. 2a). There was bleeding upon gentle probing at the defect site. The mandibular anterior teeth were crowded and 41 was more buccally positioned in the dental arch than the proximal teeth. Tooth 42 was covered buccally by a thick wide zone of keratinised tissues. Tooth 43 had not erupted yet.

A paediatric dental/orthodontic consultation noted that an initial gingival recession in tooth 41 had been detected one year before by the paediatric dentist. Instructions had been given to use soft toothbrush and modified toothbrushing technique and with monitoring every 3 months. Unfortunately, the parents did not follow this advice, and did not return until one year later. During that time the gingival recession had increased from an initial tissue loss to being quite deep. Orthodontic treatment was planned, including buccal movement of the mandibular anterior teeth.

The high progression rate of the gingival recession, ectopic position of the tooth in the dental arch and the further orthodontic treatment advocated in favour of immediate management of the gingival recession. The laterally positioned flap was selected for root coverage and augmentation of the keratinised tissues zone as there was no interproximal tissue loss and there was plenty of proximal keratinised tissues.

**Treatment.** Initial treatment followed that described in Case 1. The distal proximal site served as donor site, prepared by elevation of a partial thickness flap with mesio-distal width more than 1.5 times the width of the recipient site. The surgical procedure then followed the same pattern as with Case 1 and a flap laterally positioned over the denuded root up to the cemento-enamel junction closely adapted to the root surface and secured in place (Fig. 2b). Detailed postoperative instructions were given to the patient as described before. The sutures were removed at 10 days, when healing was satisfactory. At 2 weeks the root was completely covered (Fig. 2c). The low intra-operative and postoperative patient compliance proved that the selection of the laterally positioned flap over the free soft tissue grafts was correct in this case. If the palate had been used as donor site, the surgical procedure would have lasted longer and further postoperative care would have been required to prevent bleeding from the donor site during the initial healing phase.

**Follow-up.** The final assessment of the treatment outcome was performed at 8 months postoperatively. The root surface was completely covered by a 5 mm wide zone of keratinised tissues. There was complete colour, volume and texture matching between the tissues covering the root and the surrounding tissues (Fig. 2d).

**Discussion**

The laterally positioned flap is a relatively simple, less traumatic and time consuming surgical technique than certain other plastic surgery techniques. The use of only one surgical site reduces significantly the time required for the performance of the technique and the postoperative patient discomfort. The limited intra-operative and postoperative patient discomfort increases the chances of good patient compliance, which is crucial for a successful treatment outcome. Thus the technique is superior to the free soft tissue grafts (free gingival and connective tissue graft) in root coverage, especially for patients of young age. Additionally, the laterally positioned flap achieves excellent colour, volume and texture matching between the newly formed tissues and the surrounding tissues.

It should be emphasized that the indications for application of the laterally positioned flap are
relatively limited. The technique is indicated only in cases where there is no proximal periodontal support loss and keratinised tissues of adequate width in the apicoronal and buccolingual direction.

The final evaluation of the result should not be performed prior to the completion of a time period ranging from 6 to 12 months for the healing process to be completed and for the gingival margin to get stabilised at its final level. Creeping attachment might occur during this time period, which consists of gradual and, to a limited extent, coronal migration of the soft tissues. This process is most frequently seen in narrow defects located in the mandible that are kept free from dental plaque. Creeping attachment is not predictable and whenever it occurs the extent of further root coverage ranges from 0.5 to 1.5 mm [Matter, 1980].

When Guinard and Caffesse [1978] assessed the extent of root coverage achieved with the laterally positioned flap, they found that for gingival recessions with mean depth of 3.9 mm the mean root coverage obtained at 6 months was 2.4 mm. The mean percentage of root coverage was 69%, whereas the mean increase in the width of the keratinised tissue zone was 3.2 mm. However, the proximal (donor) teeth presented a mean increase in gingival recession of 1.1 mm and a mean reduction in the width of the keratinised tissue zone of 1.3 mm at 6 months postoperatively. In 2001, Bouchard et al. reviewed the results of six previous studies on the effectiveness of the rotational flaps for the management of Class I and Class II gingival recessions with mean defect depth of 3.9 mm. This review revealed that the mean percentage of root coverage obtained was 66%, ranging from 41 to 82%.

It should be emphasised that the use of this technique has to be for very carefully selected cases. All options to treatment must be considered before using the laterally repositioned flap. But in selected cases this approach can be beneficial.

**Conclusion**

Proper case selection, skilful and efficient performance of the technique and high patient compliance during the initial healing phase are essential for the success of the technique. Every simple step of the intra-operative and postoperative management is crucial for the effectiveness of the technique.

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**Fig. 2 - Case 2. A. Intra-oral photograph showing a 7 mm deep gingival recession at initial examination affecting tooth 41 in a 11 year old boy with thick and wide keratinized tissues at the distal proximal site. B. V-shaped incision, de-epithelialization of the tissues between the incision and the gingival margin; donor site partial thickness flap defined by a distal vertical releasing incision and a coronal submarginal incision. C. Two weeks postoperatively. D. Eight months postoperatively there is complete root coverage with a 5 mm wide keratinized tissue zone, good tissue colour and volume and texture matching of the tissues.**
References


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